SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F21-R-40

Name: Lake Byron **County**: Beadle
Legal Description: T113N- R61W- Sec. 22-23, 25-26, 28, 34-35
Location from nearest town: 11 miles north, 3 miles east, 1½ north of Huron, SD

Dates of present survey: July 30 - August 1, 2007
Dates of last survey: August 1-3, 2005

Primary Game Species	Other Species
Walleye	Northern Pike
Yellow Perch	Gizzard Shad
Black Crappie	Black Bullhead
	Common Carp
	Bigmouth Buffalo
	White Sucker
	Freshwater Drum
	Shortnose Gar
	Yellow Bullhead
	Shorthead Redhorse
	Green Sunfish
	Orange-spotted Sunfish

PHYSICAL DATA

Surface area when full: 1,805 acres **Watershed area**: 115,350 acres
Maximum depth when full: 10 feet **Mean depth when full**: 7 feet
Lake elevation observed during the survey: 2 feet low
Ordinary high water mark elevation: 1,250.0 **Date set:** March, 2001
Outlet elevation: 1,248.1 **Date set:** March, 2001
Contour map available? Yes **Date prepared:** 1970
Beneficial use classification(s): (6) warmwater semipermanent fish propagation and irrigation (7) immersion recreation, (8) limited-contact recreation, (9) fish and wildlife propagation and stock watering.

Introduction

Lake Byron is a natural lake formed by receding glacial ice. Indians originally named it Big Toad Lake because, from a distance, the large trees surrounding the lake looked like big toads. In 1866, an Indian trader named Byron Pay was camped by the lake and carved the initials of his Indian nickname “Bye” and the date on a tree. After that, local residents started calling the lake “Lake Byron”.

The size and depth of the lake varies greatly from year to year. Annual water fluctuations can vary from plus one foot to minus three feet. The lake was dry enough to

farm from 1933-1935. Fish kills are common, especially during low water years (Table 8).

Ownership of Lake and Adjacent Lakeshore Property

Lake Byron is listed as meandered public water in the State of South Dakota Listing of Meandered Lakes. The meandered portion of the lake contains about 1,450 acres. The South Dakota Department of Game, Fish and Parks (GFP) owns and maintains property on the northwest, northeast, and south sides of the lake. The remaining lakeshore property is privately owned and heavily developed.

Fishing Access

The South Lake Access Area contains a boat ramp with a dock and a public toilet. The North Lake Access Area contains a boat ramp with a dock, public toilet, picnic tables, and offers primitive camping. All public areas on the lake have shorelines suitable for shore fishing.

Field Observations of Water Quality and Aquatic Vegetation

The water in Lake Byron was stained brown during the survey with a Secchi depth measurement of 20 cm (8 in). Some scattered beds of sago pondweed (*Potamogeton pectinatus*), cattails (*Typha spp.*), and bulrushes (*Scirpus spp.*) were observed.

BIOLOGICAL DATA

Methods:

Lake Byron was sampled on July 30 - August 1, 2007 with three overnight gill-net sets and ten overnight trap-net sets. The trap nets are constructed with 19-mm-bar-mesh (¾ in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. The gill nets are 45.7 m long x 1.8 m deep (150 ft long x 6 ft deep) with one 7.6 m (25 ft) panel each of 13, 19, 25, 32, 38 and 51-mm-bar-mesh (½, ¾, 1, 1¼, 1½, and 2 in) monofilament netting. Sampling locations are displayed in Figure 4.

Results and Discussion:

Gill Net Catch

Gizzard shad (39.9%), bigmouth buffalo (23.2%), black bullhead (13.1%) and freshwater drum (11.2%) comprised 87.4% of the gill net sample (Table 1). Other species sampled included common carp, walleye, yellow perch, black crappie, northern pike and shortnose gar. Many of the freshwater drum and gizzard shad captured in the gill and trap nets were age-0 fish.

Table 1. Total catch from three overnight gill net sets at Lake Byron, Beadle County, July 30 - August 1, 2007.

Species	Number	Percent	CPUE[1]	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Gizzard Shad	146	39.9	48.7	±37.6	5.8	--	--	--
Bigmouth Buffalo	85	23.2	28.3	±9.3	12.4	2	0	97
Black Bullhead	48	13.1	16.0	±3.7	77.1	69	4	93
Freshwater Drum	41	11.2	13.7	±6.7	2.7	94	18	117
Common Carp	15	4.1	5.0	±3.4	35.0	86	0	97
Walleye	13	3.6	4.3	±1.7	28.7	92	0	98
Yellow Perch	10	2.7	3.3	±1.1	23.8	100	50	99
Black Crappie	5	1.4	1.7	±1.5	0.4	--	--	--
Northern Pike	2	0.5	0.7	±0.4	1.3	--	--	--
Shortnose Gar	1	0.3	0.3	±0.4	0.0	--	--	--

* 6 years (1995, 1997, 1999, 2001, 2003, 2005)

Trap Net Catch

Freshwater drum (23.2%) were the most abundant species sampled in the trap nets followed by common carp (17.9%), black crappie (15.3%), and black bullhead (14.8%) (Table 2). Thirteen other species were also sampled.

Table 2. Total catch from ten overnight trap net sets at Lake Byron, Beadle County, July 30 - August 1, 2007.

Species	Number	Percent	CPUE	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Freshwater Drum	204	23.2	20.4	±15.3	0.6	57	14	120
Common Carp	158	17.9	15.8	±5.3	32.1	74	5	88
Black Crappie	135	15.3	13.5	±3.4	2.2	79	9	122
Black Bullhead	130	14.8	13.0	±4.0	302.9	43	0	101
Gizzard Shad	76	8.6	7.6	±5.5	0.0	--	--	--
Bigmouth Buffalo	62	7.0	6.2	±1.7	4.7	9	2	92
Shortnose Gar	44	5.0	4.4	±1.6	0.5	--	--	--
White Sucker	20	2.3	2.0	±0.7	4.7	85	85	89
Northern Pike	15	1.7	1.5	±0.6	0.6	86	50	74
O. S. Sunfish	13	1.5	1.3	±0.9	0.1	--	--	--
Walleye	11	1.2	1.1	±0.8	3.5	100	18	84
Channel Catfish	5	0.6	0.5	±0.5	0.0	--	--	--
Yellow Perch	4	0.5	0.4	±0.5	2.7	--	--	--
Green Sunfish	1	0.1	0.1	±0.1	0.2	--	--	--
Shorthead Redhorse	1	0.1	0.1	±0.1	0.2	--	--	--
River Carpsucker	1	0.1	0.1	±0.1	0.0	--	--	--
Hybrid Sunfish	1	0.1	0.1	±0.1	0.0	--	--	--

* 8 years (1989, 1991, 1995, 1997, 1999, 2001, 2003, 2005)

[1] See Appendix A for definitions of CPUE, PSD, and mean Wr.

Walleye

Management objective: Maintain a walleye fishery with a gill-net CPUE of at least 15 and a growth rate of 35 cm (14 in) by age-3.

Walleye gill-net CPUE in 2007 was much lower than in previous lake surveys and reflected the absence of smaller walleyes (< 25 cm or 10 inches) in the population (Table 3). Most of the fish sampled ranged in length from 41 to 48 cm (16 – 19 inches) (Figure 1) and were in excellent condition with a mean Wr of 98.

Walleye stocking was suspended for several years due to low water and because the 2004 stocking produced a very large year class (Table 7). It is obvious that maintaining the walleye population relies heavily on stocking. Therefore, another fry stocking will be scheduled for 2008.

Table 3. Walleye gill-net CPUE, PSD, RSD-P and mean Wr for Lake Byron, Beadle County, 1999-2007.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	Mean*
CPUE	10.7		11.0		42.5		68.0		4.3	30.8
PSD	64		8		18		26		92	33
RSD-P	9		0		4		0		0	3
Mean Wr	90		88		98		99		98	92

*5 years (1997, 1999, 2001, 2003, 2005)

Yellow Perch

Management objective: Maintain a yellow perch fishery with a gill-net CPUE of at least 25.

Yellow perch CPUE and PSD decreased from 2005 due to inconsistent recruitment in recent years (Table 4 and Figure 2). Reduced black bullhead abundance has not resulted in increased yellow perch abundance. This may indicate that the factors influencing the recruitment of both species may be related.

Table 4. Yellow perch gill-net CPUE, PSD, RSD-P and mean Wr for Lake Byron, Beadle County, 1999-2007.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	Mean*
CPUE	11.7		12.7		27.5		19.0		3.3	25.6
PSD	86		39		98		53		100	72
RSD-P	11		7		65		45		50	28
Mean Wr	102		102		105		104		99	105

*5 years (1997, 1999, 2001, 2003, 2005)

Black Bullhead

Management objective: Maintain a black bullhead fishery with a trap-net CPUE of less than 100.

Black bullhead CPUE has dropped dramatically since 2003 and is well below our management objective (Table 5). A large percentage (43%) of the sampled fish exceeded 23 cm (9 in) which is a desirable size for anglers.

Table 5. Black bullhead trap-net CPUE, PSD, RSD-P, and Mean Wr for Lake Byron, Beadle County, 1999-2007.

	1999	2000	2001	2002	2003	2004	2005	2006	2007	Mean*
CPUE	598.4		55.0		240.0		11.4		13.0	879.4
PSD	21		63		53		33		43	36
RSD-P	0		6		5		10		0	4
Mean Wr	92		87		98		101		101	95

*5 years (1997, 1999, 2001, 2003, 2005)

All Species

High water levels in 2007 connected Lake Byron with the James River and allowed gizzard shad and river carpsucker to enter the lake for the first time in a decade (Table 6).

Table 6. Gill-net (GN) and trap-net (TN) CPUE for all fish species sampled in Lake Byron, Beadle County, 1999-2007.

Species	1999	2000	2001	2002	2003	2004	2005	2006	2007
SNG (GN)	--		--		--		--		0.3
SNG (TN)	0.6		0.4		1.6		0.5		4.4
GOE (GN)	--		--		--		--		--
GOE (TN)	--		0.1		--		--		--
GZD (GN)	--		--		--		--		48.7
GZD (TN)	--		--		--		--		7.6
COC (GN)			0.2		--		209.5		5.0
COC (TN)	3.7		1.2		2.6		195.8		15.8
RIC (GN)	--		--		--		--		--
RIC (TN)	--		--		--		--		0.1
WHS (GN)	1.7		9.5		8.0		4.5		--
WHS (TN)	4.7		6.3		14.8		9.6		2.0
BIB (GN)	12.7		2.0		6.0		38.0		28.3
BIB (TN)	1.5		1.6		1.8		27.4		6.2
SHR (GN)	--		--		--		--		--
SHR (TN)	--		0.5		0.6		0.5		0.1
BLB (GN)	208.3		14.7		46.0		1.0		16.0
BLB (TN)	598.4		55.0		240.0		11.4		13.0
YEB (GN)	--		--		--		--		--
YEB (TN)	--		0.4		--		0.4		--
CCF (GN)	--		--		--		--		--
CCF (TN)	--		--		0.1		--		0.5
NOP (GN)	1.0		0.2		--		1.0		0.7
NOP (TN)	2.0		2.1		0.9		--		1.5
GSF (GN)	--		--		--		--		--
GSF (TN)	--		--		--		1.6		0.1
OSF (GN)	--		--		0.5		--		--
OSF (TN)	--		--		--		0.6		1.3
HYB (GN)	--		--		--		--		--
HYB (TN)	--		--		--		--		0.1
WHC (GN)	--		--		--		--		--
WHC (TN)	--		--		0.1		--		--
BLC (GN)	0.7		0.2		0.5		0.5		1.7
BLC (TN)	2.8		6.2		4.1		1.5		13.5
YEP (GN)	11.7		12.7		27.5		19.0		3.3
YEP (TN)	1.6		0.3		1.4		15.0		0.4
WAE (GN)	10.7		11.0		42.5		68.0		4.3
WAE (TN)	1.3		4.6		4.9		4.5		1.1
FWD (GN)	1.7		1.0		2.5		9.5		13.7
FWD (TN)	0.5		1.8		0.5		0.3		20.4

SNG (Shortnose Gar), GOE (Goldeye), GZD (Gizzard Shad), COC (Common Carp), RIC (River Carpsucker), WHS (White Sucker), BIB (Bigmouth Buffalo), SHR (Shorthead Redhorse), BLB (Black Bullhead), YEB (Yellow Bullhead), CCF (Channel Catfish), NOP (Northern Pike), GSF (Green Sunfish), OSF (Orangespotted Sunfish), HYB (Hybrid Sunfish), WHC (White Crappie), BLC (Black Crappie),YEP (Yellow Perch), WAE (Walleye), FWD (Freshwater Drum).

MANAGEMENT RECOMMENDATIONS

1. Stock walleye and yellow perch as needed to accomplish management objectives or following fish kills to reestablish the fishery.

2. Encourage commercial fishing for rough fish and black bullheads.

3. Investigate the feasibility of installing handicapped-accessible fishing docks on property owned by GFP.

4. Investigate the feasibility of installing rough fish barriers on the inlet and outlet to limit rough fish migration.

Table 7. Stocking record for Lake Byron, Beadle County, 1995-2007.

Year	Number	Species	Size
1995	1,354	Black Crappie	Fingerling
	23	Largemouth Bass	Adult
	3,700,000	Walleye	Fry
1996	2,625,000	Walleye	Fry
	105	Walleye	Lrg. Fingerling
	175,661	Yellow Perch	Fingerling
1997	900,000	Walleye	Fry
1999	10,500	Yellow Perch	Adult
2000	190,315	Walleye	Fingerling
	28,575	Yellow Perch	Juvenile
2001	1,895,000	Walleye	Fry
2004	1,900,000	Walleye	Fry

Table 8. History of known fish kills for Lake Byron, Beadle County.

When	Type of Kill	Severity*
1959-60	Winterkill	Heavy
1960-61	Winterkill	Light
1968-69	Winterkill	Heavy
1985-86	Winterkill	Heavy
1993-94	Winterkill	Moderate
1996-97	Winterkill	Moderate
1998	Summerkill	Light

*Total – no live fish found
Heavy – large numbers of dead fish, some kill-resistant fish alive
Moderate – moderate numbers of dead fish, some kill-resistant and kill-prone fish alive
Light – just a few kill-prone fish found dead

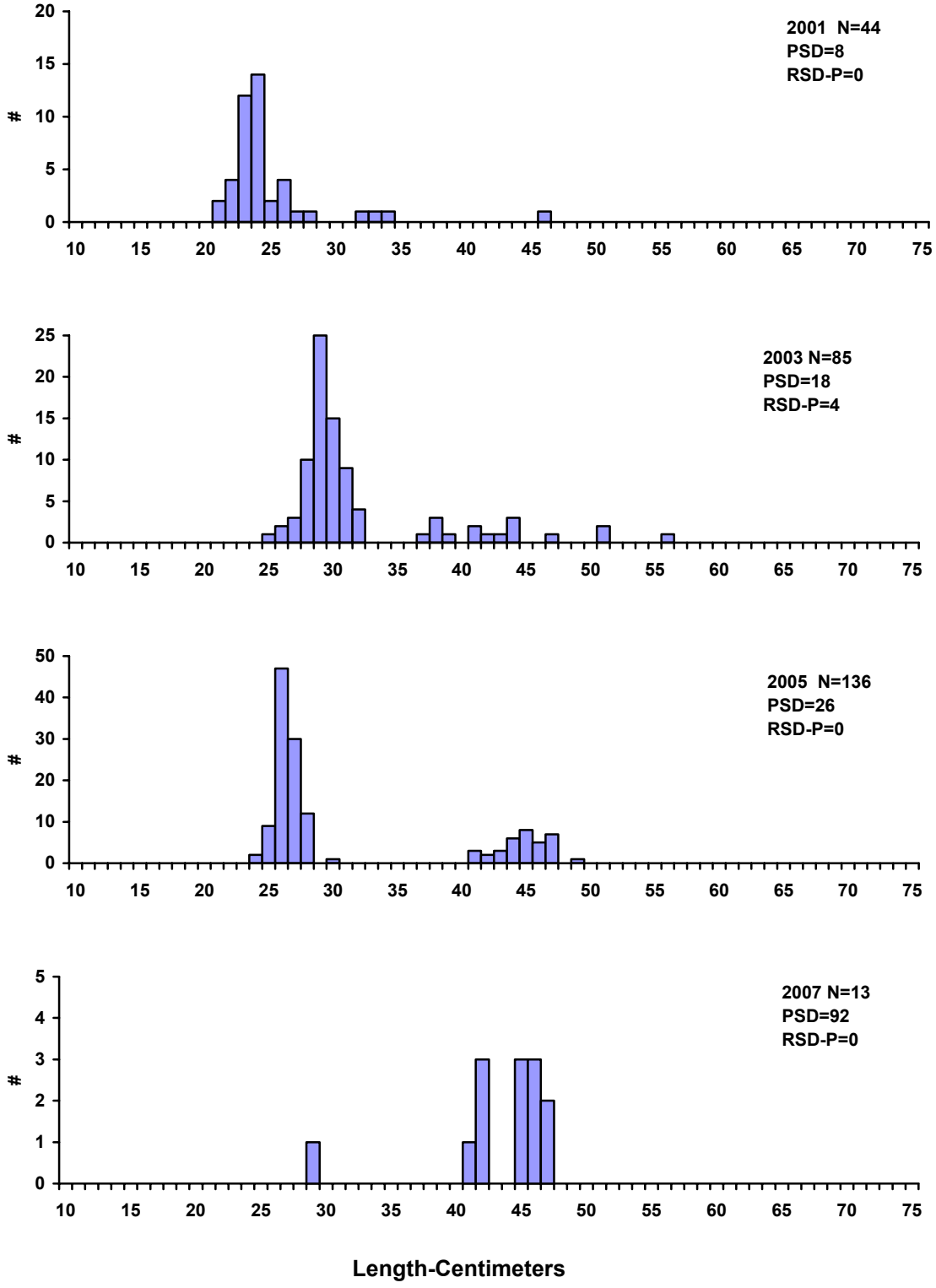


Figure 1. Length frequency histograms for walleye sampled with gill nets in Lake Byron, Beadle County, 2001, 2003, 2005, and 2007.

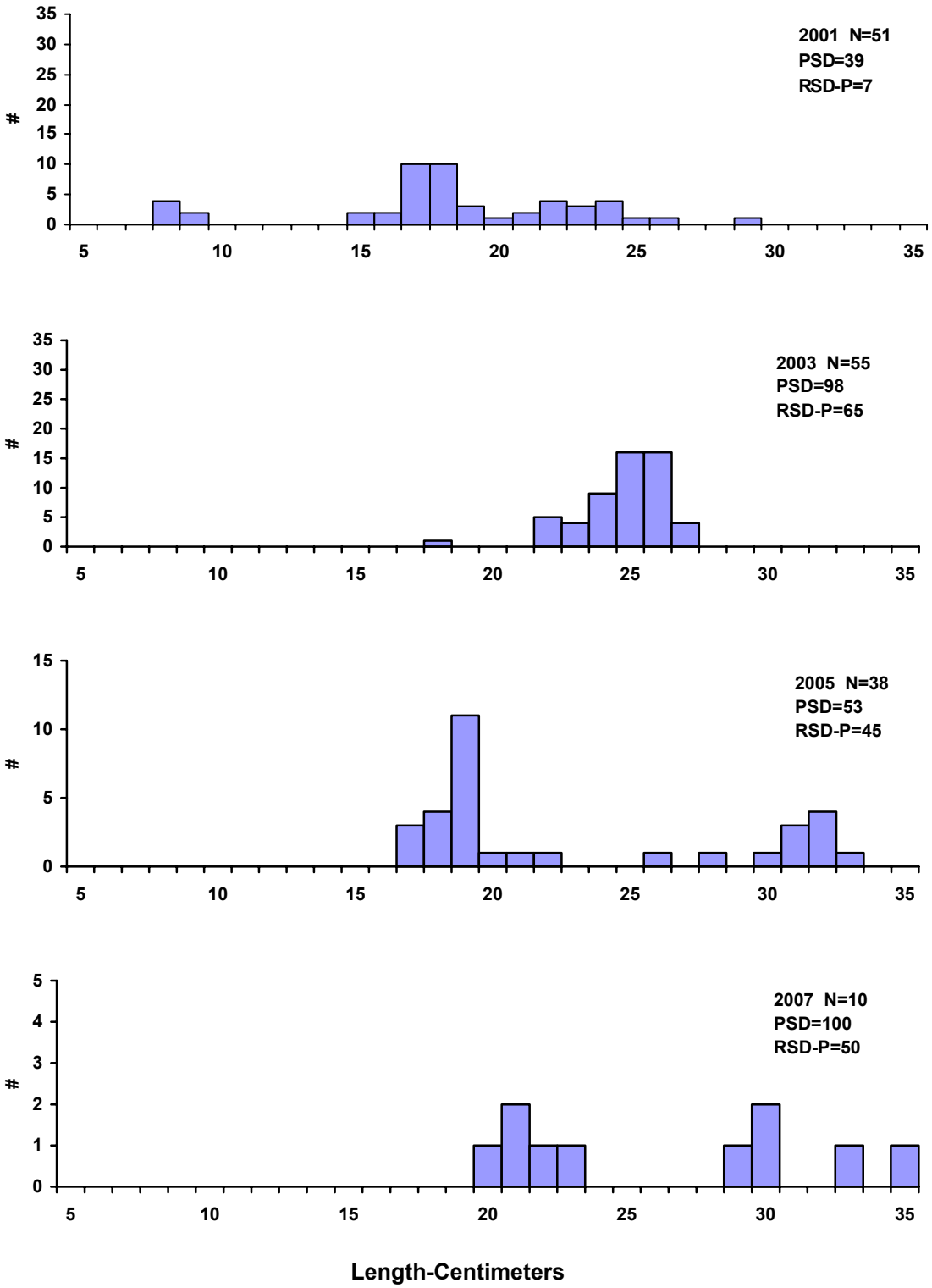


Figure 2. Length frequency histograms for yellow perch sampled with gill nets in Lake Byron, Beadle County, 2001, 2003, 2005, and 2007.

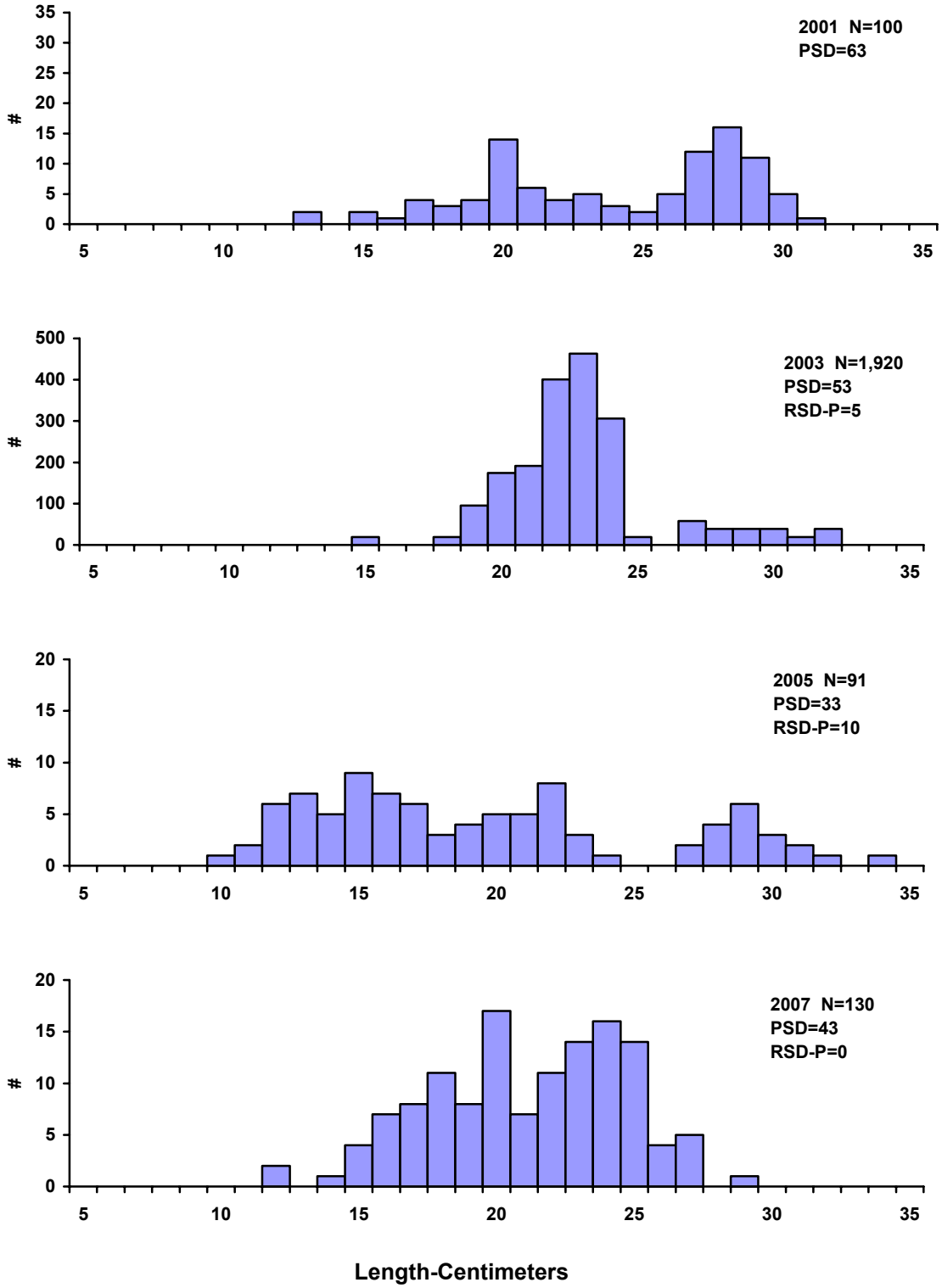
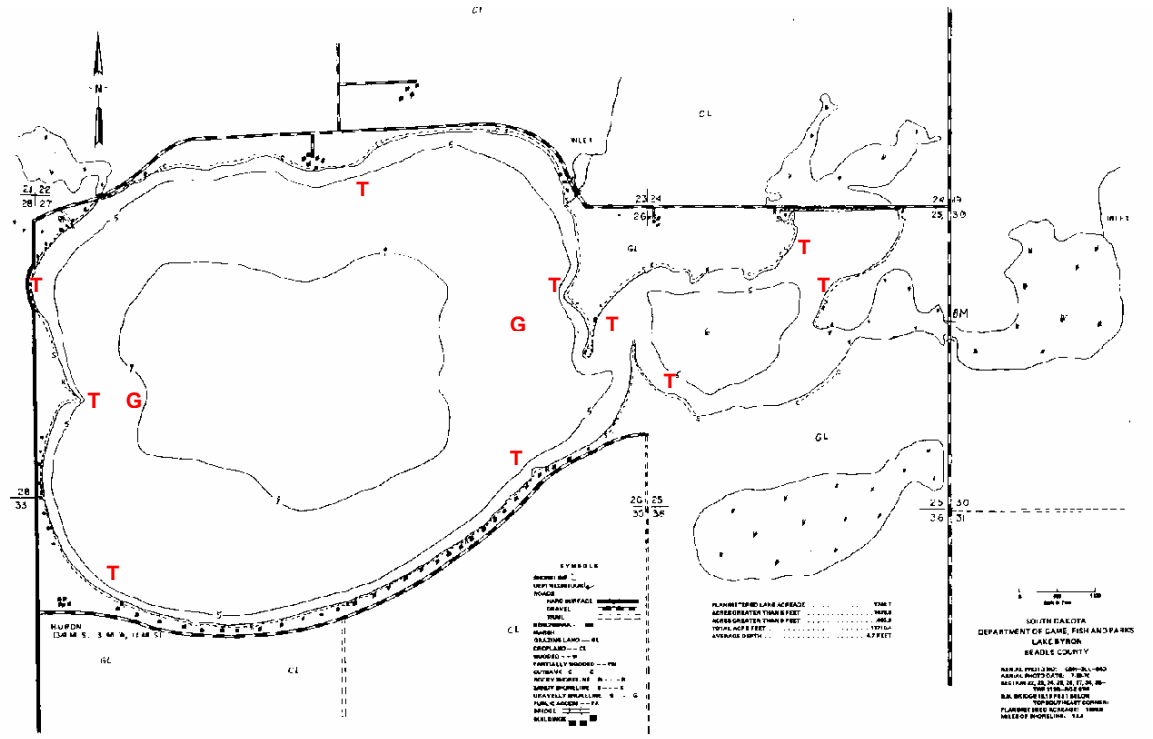


Figure 3. Length frequency histograms for black bullheads sampled with trap nets in Lake Byron, Beadle County, 2001, 2003, 2005, and 2007.



Legend
Gill Nets: G
Trap Nets: T

Figure 4. Sampling locations on Lake Byron, Beadle County, 2007.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch Per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$PSD = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$RSD\text{-}P = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters.

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25	38	51	63	76
Sauger	20	30	38	51	63
Yellow perch	13	20	25	30	38
Black crappie	13	20	25	30	38
White crappie	13	20	25	30	38
Bluegill	8	15	20	25	30
Largemouth bass	20	30	38	51	63
Smallmouth bass	18	28	35	43	51
Northern pike	35	53	71	86	112
Channel catfish	28	41	61	71	91
Black bullhead	15	23	30	38	46
Common carp	28	41	53	66	84
Bigmouth buffalo	28	41	53	66	84
Smallmouth buffalo	28	41	53	66	84

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.